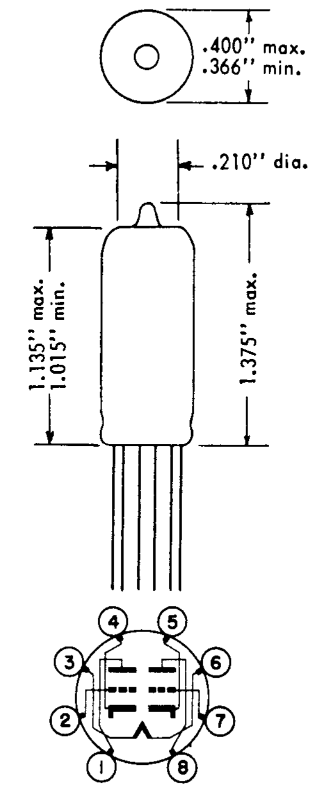
TYPE CK6112WA

Excellence in Electronics



BOTTOM VIEW

The 6112WA is a heater-cathode type high-mu double triode of subminiature construction, capable of operation in the UHF region. This type is characterized by long life and stable performance. It is designed for service where severe conditions of high temperature and mechanical shock or vibration are encountered. The flexible terminal leads may be soldered or welded directly to the terminals of circuit components without the use of sockets. Standard 8-Pin subminiature sockets may be used by cutting the leads to a suitable length.

MECHANICAL DATA

ENVELOPE: T–3 Glass

BASE: Subminiature Button 8-Pin (0.017" tinned flexible leads Length: 1.5" min.)

TERMINAL CONNECTIONS:

Lead 1 Plate, Unit #2	Lead 5 Cathode, Unit #1
Lead 2 Grid, Unit #2	Lead 6 Heater
Lead 3 Heater	Lead 7 Grid, Unit #1
Lead 4 Cathode, Unit #2	Lead 8 Plate, Unit #1

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test-Note 3)	450 G
Maximum Uniform Acceleration (Centrifuge Test-Note 4)	1000 G
Maximum Vibrational Acceleration (96 Hour Fatigue Test-Note 5)	2.5 G
Maximum Bulb Temperature	220 °C

MOUNTING POSITION: Any

ELECTRICAL DATA

CAUTION-----To Electronic Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if design maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

RATINGS AND NORMAL OPERATION	MIL-E-1 SYMBOL	DESIGN MINIMUM	NORMAL TEST CONDITIONS (Note 7)	NORMAL OPERATION (Note 6)	DESIGN MAXIMUM	MIL-E-1 UNITS
Heater Voltage (Note 8)	Ef:	6.0	6.3	6.3	6.6	V
Plate Voltage	Eb:	----	100	100	250	Vdc
Peak Plate Voltage	ep:	----	----	----	360	v
Grid #1 Voltage	Ec1:	–55	0	0	----	Vdc
Plate Dissipation (per plate)	Pp/p:	----	----	0.08	0.3	W
Grid #1 Circuit Resistance	Rg/g:	----	----	1.0	1.1	Meg.
Heater-Cathode Voltage	Ehk:	–200	----	100	+200	Vdc
Plate Current (per plate)	Ib/p:	----	----	0.8	3.3	mAdc
Grid Current	Ic/c:	----	----	----	----	mAdc
Cathode Resistance (per unit)	Rk:	----	1500	1500	----	ohms
Transconductance (per plate)	Sm/p:	----	----	1800	----	μmhos
Amplification Factor	Mμ/p:	----	----	70	----	----

Tentative Data

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

(In the following tests, each unit is tested separately)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN.	LAL	BOGIE	UAL.	MAX	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS-Part 1		**Combined AQL = 1.0% Excluding Mechanical and Inoperatives**								
Heater Current:		0.4	If:	285	----	----	----	315	----	mA
Heater-Cathode Leakage:	Ehk=+100 Vdc Ehk=–100 Vdc	0.4	Ihk:	----	----	----				
			Ihk:	----	----	----	----	3.5	----	µAdc
							----	3.5	----	µAdc
Grid Current:	Eb=150 Vdc; Ec=0; Rk=820 ohms; Rg=1.0 Meg.	0.4	Ic (1):	----	----	----	----	–0.3	----	µAdc
Plate Current (1):		0.4	Ib (1):	0.50	----	0.8	----	1.10	----	mAdc
Plate Current (2):	Ec1=–2.8 Vdc	0.4	Ib (2):	----	----	----	----	50	----	µAdc
Transconductance (1):		0.4	Sm (1):	1500	1650	1800	1950	2100	350	µmhos
Continuity and Shorts (Inoperatives):	(Note 12)	0.4	----	----	----	----	----	----	----	----
Mechanical:	Envelope (8-1) (Note 10)	----	----	----	----	----	----	----	----	----
MEASUREMENTS ACCEPTANCE TESTS PART 2										
Insulation of Electrodes:	Ef=6.3 V; Eg-all=–100 Vdc; Ep-all=–300 Vdc;	2.5	Rg-all: Rp-all:	250 250	---- ----	---- ----	---- ----	---- ----	---- ----	Meg. Meg.
Transconductance (2):	Ef=5.7 V; (Note 9)	2.5	Δ_{Ef} Sm (2):	----	----	----	----	15	----	%
Grid Emission:	Eb=250 Vdc; Rg=1.0 Meg; Rk=2700 ohms; Ef=7.5 V; Preheat at Ec=0; Test at Ec=–9.0 Vdc	6.5	Ic (2):	----	----	----	----	–0.5	----	µAdc
AF Noise:	Esig=45 mVac; Rg=0.5 Meg.; Rp=0.2 Meg.; Rk=750 ohms; Ck=1000µf; Units connected in parallel	2.5	EB:	----	----	----	----	17	----	VU
Amplification Factor:		6.5	Mu:	60	----	70	----	80	----	----
A. C. Amplification:	Esig=0.2 Vac; Ebb=100 Vdc; Ecc=0; Rk=0; Rg1=10 Meg.;	6.5	Ep:	8.0	----	----	----	----	----	Vac
Heater-Cathode Leakage (2):	Ef=–6.7 V; Pin 6 negative; Ehk=+100 Vdc; Cathode negative t=16 sec.; (Note 13)	6.5	Ihk (2):	----	----	----	----	1.0	----	µAdc
Capacitance:			Cgp:	0.8	----	1.00	----	1.20	----	µµf
Capacitance:			Cin:	1.30	----	1.70	----	2.10	----	µµf
Capacitance:	(Note 2)	6.5	Cout: Unit #1	0.16	----	0.23	----	0.30	----	µµf
Capacitance:			Cout Unit #2	0.21	----	0.28	----	0.35	----	µµf
Capacitance:			Cgg:	----	----	----	----	0.014	----	µµf
Capacitance:			Cpp:	----	----	----	----	0.80	----	µµf
Low Pressure Breakdown:	Pressure=21± 3 mmHG; Voltage=300 Vac	6.5								
Vibration (2):	F=40 cps; G=15; Rp=10,000 ohms	2.5	Ep:	----	----	----	----	20	----	mVac
Vibration (3):	F=70-2000; t=3 minutes; G=15; Rp=10,000 ohms; Positions X and X2 only.	6.5	ep:	----	----	----	----	75 peak to peak	----	mv
Operation Time:	(Note 11)	4.0	t:	----	----	----	----	20	----	sec.

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (cont'd)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defects per characteristic 1st Sample	Combined Samples
DEGRADATION RATE ACCEPTANCE TESTS								
Subminiature Lead Fatigue:		2.5	----	4.0	----	arcs	----	----
Shock (1):	Ehk=+100 Vdc; Rg= 0.1 Meg.; Hammer Angle = 30°; (Note 3)	20	----	----	----	----	----	----
Fatigue (1):	96 hours; G=2.5; Fixed frequency; F= 25 min; 60 max.; (Note 5)	6.5	----	----	----	----	----	----
Shock (2):	Ehk=+100 Vdc; Rg= 0.1 Meg.; Hammer Angle = 120°+ Rubber Pad; t=10 milliseconds; G= 75; (Note 15)	20	----	----	----	----	----	----
Fatigue (2):	6 hours; G=10; F= 130-2000-130 cps; (Note 14)	6.5	----	----	----	----	----	----
Post Shock and Fatigue (1) and (2) Test End Points:								
Vibration (2):	F=40 cps; G=15; Rp= 10,000 ohms	----	Ep:	----	80	mVac	----	----
Heater-Cathode Leakage:	Ehk=+100 Vdc	----	Ihk (1):	----	7	μAdc	----	----
	Ehk=−100 Vdc	----	Ihk (1):	----	7	μAdc	----	----
Change in Transconductance (1) of individual tubes:	Ef=6.3 V	----	Δ_tSm (1):	----	15	%	----	----
Grid Current (1):		----	Ic (1):	----	−1.0	μAdc	----	----
Glass Strain (Thermal Shock):		6.5	----	----	----	----	----	----
ACCEPTANCE LIFE TESTS								
Heater Cycling:	Ef=7.0 V; Eb=Ec= OV; Ehk=140 Vac; 1 min. on, 4 min. off	1.0	----	2000	----	cycles	----	----
Heater Cycling Life Test End Points:								
Heater-Cathode Leakage:	Ehk=+100 Vdc	----	Ihk (1):	----	10	μAdc	----	----
	Ehk=−100 Vdc	----	Ihk (1):	----	10	μAdc	----	----
2 & 20 Hour Stability Life Test:	TA=Room; Ehk=+200 Vdc; Rg/g=1.0 Meg.; Eb=150 Vdc; Rk/k= 820 ohms	----	----	----	----	----	----	----
2 & 20 Hour Stability Life Test End Points:								
Change in Transconductance (1) of individual tubes:	(Typical Sample Size= 50 tubes)	1.0	Δ_tSm (1):	----	10	%	----	----
100 Hour Survival Rate Life Test:	TA=Room; Ehk=+200 Vdc; Rg/g=1.0 Meg.; Eb =150 Vdc; Rk/k=820 ohms							
100 Hour Survival Rate Life Test End Points:	(Typical Sample Size= 200 tubes)	----	----	----	----	----	----	----
Continuity and Shorts (Inoperatives):		0.65	----	----	----	----	----	----
Transconductance (1):		1.0	Sm (1):	1200	----	μmhos	----	----

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (Cont'd)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defects per characteristic 1st Sample	Combined Samples
ACCEPTANCE LIFE TESTS (cont'd)								
200 Hour Intermittent Life Test (1):	TA=Room; Eb=250 Vdc; Ehk=+200 Vdc; Rg/g=1.0 Meg.; Rk/k=2700 ohms							
200 Hour Intermittent Life Test (1) End Points:	(Typical Sample Size= 20 tubes 1st sample; 40 tubes 2nd sample)							
Inoperatives:		----	----	----	----	----	1	3
Grid Current (1):		----	Ic 1:	----	–0.9	µAdc	1	3
Heater Current:		----	If:	276	328	mA	1	3
Change in Transconductance of individual tubes:		----	Δ_tSm (1):	----	25	%	1	3
Transconductance (2):		----	Δ_{Ef}Sm (2):	----	20	%	1	3
Heater-Cathode Leakage (1):	Ehk=+100 Vdc Ehk=–100 Vdc	---- ----	Ihk (1): Ihk (1):	---- ----	10 10	µAdc µAdc	1	3
Insulation of Electrodes:								
g-all: p-all:		---- ----	Rg-all: Rp-all:	100 100	---- ----	Meg. Meg.	1	3
Total Defectives:		----	----	----	----	----	3	6
Hour Intermittent High Temperature Life Test (2):	T Bulb=220°C; Ehk= =200 Vdc; Rg/g= 1.0 Meg.; Eb=150 Vdc; Rk/k=820 ohms	----	----	----	----	----	----	----
500 Hour Intermittent High Temperature Life Test (2) End Points:	(Typical Sample Size= 20 tubes 1st sample, 40 tubes 2nd sample)	----	----	----	----	----	----	----
Inoperatives:		----	----	----	----	----	1	3
Grid Current (1):		----	Ic (1):	----	–0.7	µAdc	1	3
Heater Current:		----	If:	276	328	mA	1	3
Transconductance (1) change of individual tubes from initial:		----	Δ_tSm(1):	----	20	%	1	3
Transconductance (2):	(Note 9)	----	Δ_{Ef}Sm (2):	----	15	%	1	3
Heater-Cathode Leakage (1):	Ehk=+100 Vdc	---- ----	Ihk (1): Ihk (1):	---- ----	10 10	µAdc µAdc	1	3
Insulation of Electrodes:								
g-all: p-all:		---- ----	Rg-all: Rp-all:	50 50	---- ----	Meg. Meg.	1	3
Transconductance (1) Average Change:		----	Avg.Δ_tSm (1):	----	15	%	1	3
Total Defectives:		----	----	----	----	----	3	6
1000 Hour High Temperature Life Test (2) End Points:	(Typical Sample Size= 20 tubes 1st sample; 40 tubes 2nd sample)	----	----	----	----	----	----	----
Inoperatives:		----	----	----	----	----	1	3
Grid Current (1):		----	Ic1:	----	–1.0	µAdc	1	3
Heater Current:		----	If:	276	328	mA	1	3
Transconductance (1) change of individual tubes from initial:		----	Δ_tSm (1):	----	25	%	1	3

RAYTHEON

RELIABLE SUBMINIATURE DOUBLE TRIODE

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (Cont'd)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defects per characteristic 1st Sample	Combined Samples
ACCEPTANCE LIFE TESTS (cont'd)								
Transconductance (2):	(Note 9)	----	Δ_{Ef}Sm(2):	----	20	%	1	3
Heater-Cathode Leakage (1):	Ehk (1)=+100 Vdc	----	Ihk (1):	----	10	μAdc	1	3
	Ehk (1)=−100 Vdc	----	Ihk (1):		10	μAdc		
Insulation of Electrodes:								
g1-all:		----	Rg-all:	25	----	Meg.	2	5
p-all:		----	Rp-all:	25	----	Meg.		
Total Defectives:		----	----	----	----	----	4	8

NOTES

Note 1: Characteristics, Quality Control Test Precedures, and Inspection Levels are made according to the appropriate paragraph of MIL-E-1, "Inspection Instructions for Electron Tubes", and MIL-STD-105A.

Note 2: Without Shield.

Note 3: Test conditions and acceptance criteria per Shock Test procedures of MIL-E-1 basic specifications.

Note 4: Centrifuge Test with forces applied in any direction.

Note 5: Test conditions and acceptance criteria per Fatigue Test procedures of MIL-E-1 basic specifications.

Note 6: These normal values represent conditions at which control of reliability may be expected.

Note 7: These normal test conditions are used for all characteristic tests unless otherwise stated under the individual test item.

Note 8: For most applications the performance will not be adversely affected by ± 5% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 9: Change of transconductance for individual tubes from that value measured at Ef=6.3V to that value measured at Ef=5.7 V.

Note 10: In addition to meeting the tightened electrical, physical and mechanical tests described in this data sheet, these Raytheon Reliable tubes are now guaranteed to be free from "Potential" defects identifiable by microscopic inspection as described by Appendix B of MIL-E-1 basic specifications.

Note 11: Operation time is the time in seconds required for the plate current to attain a value within ± 10% of the three (3) minute plate current (1) value measured at plate current (1) test conditions. No preheating before this test is allowed, a cold tube must be used.

Note 12: During both continuity and short testing, the tube under test shall be tapped at least three times in each of two planes 90° apart with a tapper which shall be adjusted to give an impulse of approximately one half sine wave of 300 ± 50 micro seconds duration and having a minimum average amplitude of 80 G's peak acceleration as measured with a Gulton A-305 accelerometer and KA-1 kit. The shorts detecting equipment shall be a device capable of detecting as shorts, the following interelement resistances of the given time duration.

Duration	Sensitivity
Permanent short	600,000 ohms
500 micro seconds	500,000 ohms
100 micro seconds	100,000 ohms
60 micro seconds	1,000 ohms

Tubes which give an indication of one or more of the following shall be rejected as inoperable:

a. either a permanent or tap short at any time during the tapping procedure
b. any open circuit
c. air leaks

ELECTRICAL DATA (Cont'd)

NOTES (Cont'd)

Note 13: Heater-Cathode Leakage (2) shall be performed as follows:

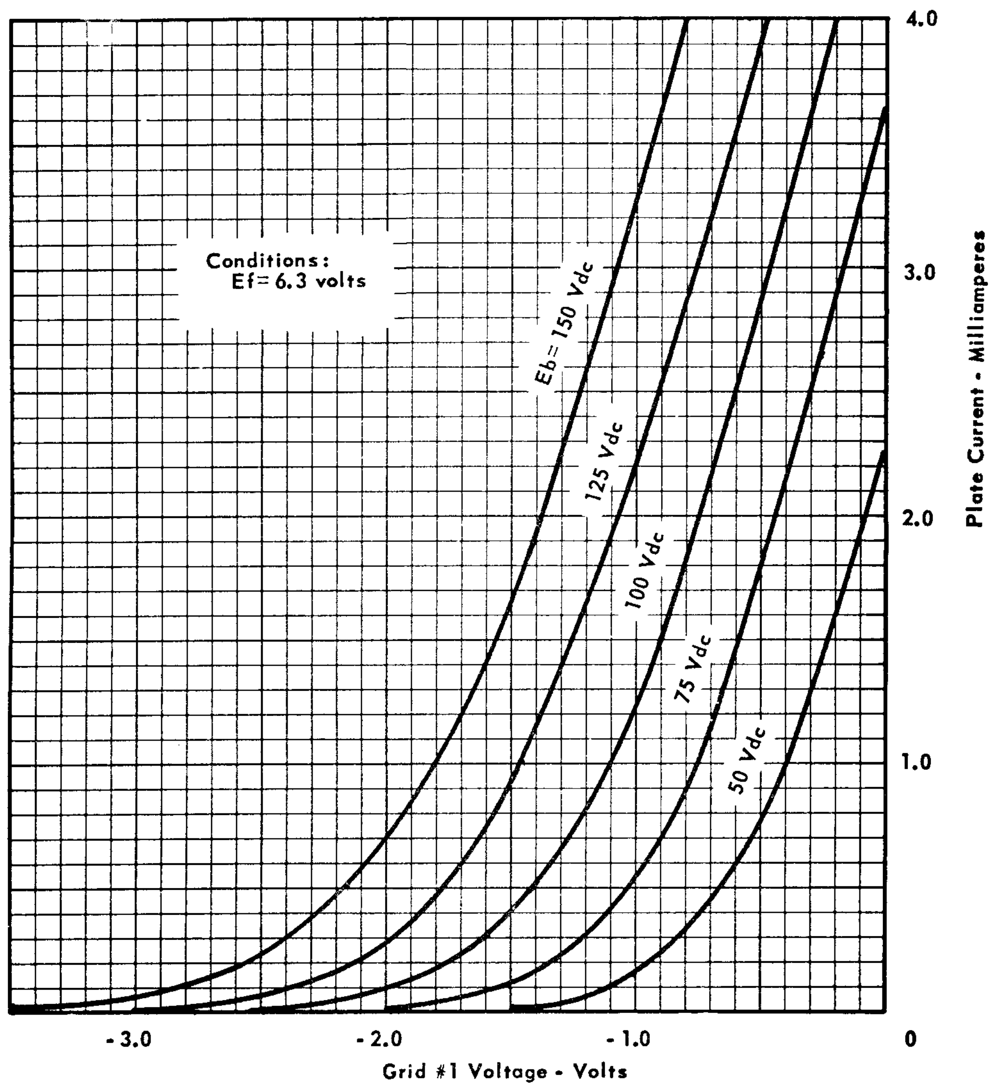
a. preheat tubes for 10 seconds with E_f = 10.5V
b. test immediately by the application of the specified test conditions for this test
c. after 16 seconds read Heater-Cathode Leakage of each section.

Note 14: The tubes shall be rigidly mounted on a table vibrating with simple harmonic motion. The tubes shall be vibrated for a total of 6 hours, 2 hours in each of three positions, X1, X2 and Y1. Only rated heated voltage shall be applied. Tubes which show one or more of the following defects shall be considered failures.

a. tubes which show permanent or tap shorts or open circuits following fatigue test, when tested as specified in 4.7.2. and 4.7.3
b. tubes which do not comply with post fatigue limits, this is a destructive test

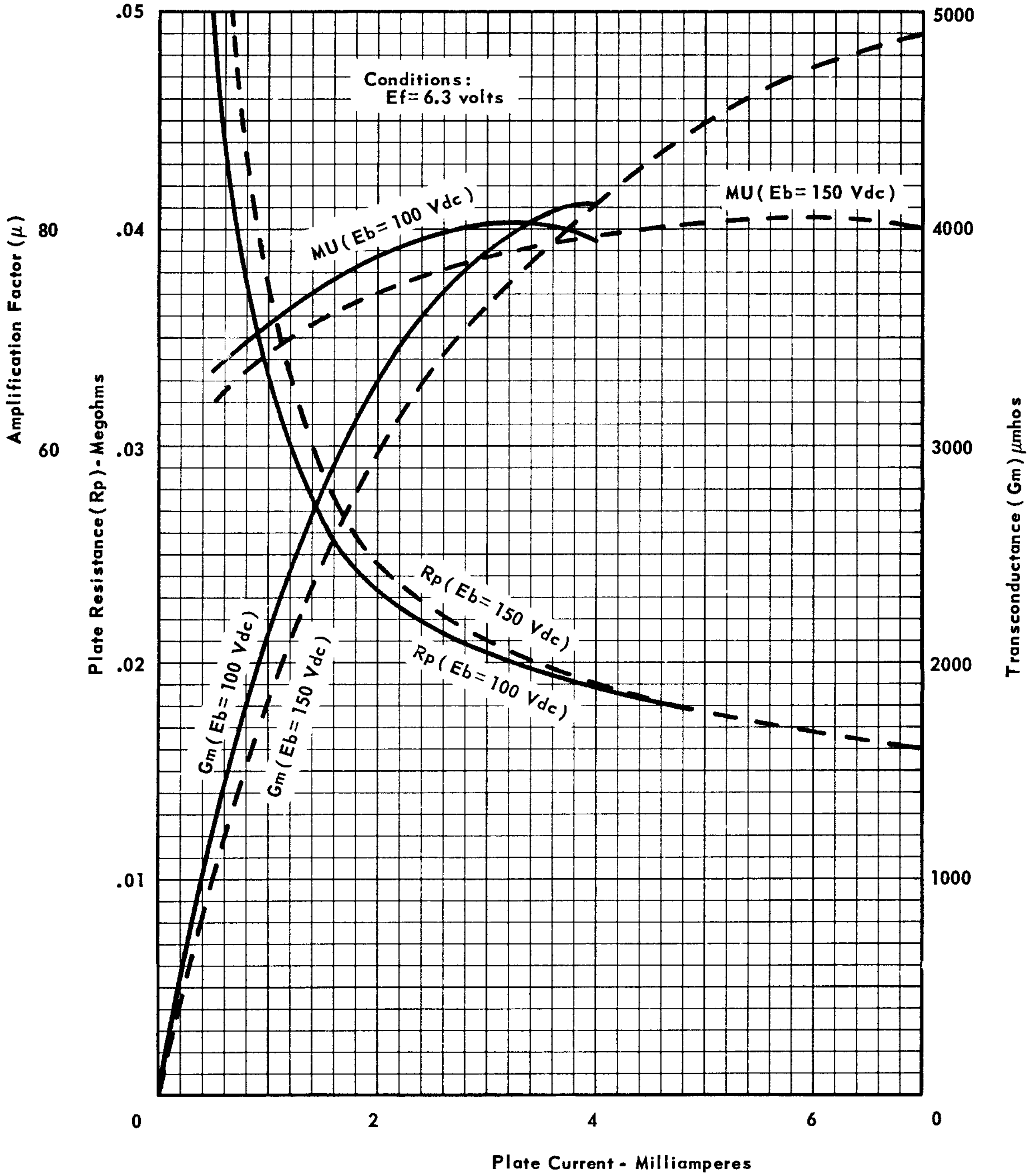
Note 15: The provisions of paragraph 4.9.20.5 of Specification MIL-E-1 shall apply, except for test conditions listed for shock test (2).

AVERAGE CHARACTERISTICS



RELIABLE SUBMINIATURE DOUBLE TRIODE

AVERAGE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS

